Mission Assurance Guidelines

for the

University Earth System Science Project

April 27, 2000

Agenda

- Introduction
- Design/Quality Assurance
- Systems Review
- Risk Mitigation and Mission Readiness
- Requirements Verification
- Flight and Ground Safety
- References

Introduction

- Each Earth Explorers project/mission must plan and implement a comprehensive Mission Assurance program.
  - It must apply to all flight hardware, software, ground support equipment and mission operations.
  - It must include the following systems/processes:
    - design assurance
    - quality assurance
    - systems review
    - requirements verification
    - risk mitigation
    - mission readiness

Design Assurance

- The project/mission team must plan and implement:
  - A parts program that assures mission reliability and performance requirements are met.
  - A materials and processes program that addresses materials and fastener selection.
  - A reliability program which interacts with all mission disciplines such that design, manufacture and test activities are executed to assure mission success.
  - A structured program for software development.

Quality Assurance

- The project/mission team must:
  - Define and implement a quality system based on ANSI/ASQC Q9001-1994 that meets the intent of ISO 9001.
  - Impose workmanship standards which assure mission lifetime and performance requirements are met.
  - Define and implement a failure reporting system.

System Reviews

- Required reviews for Earth Explorer projects/missions:
  - Preliminary Design Review (PDR)
  - Mission Design Review (MDR)
  - Confirmation Readiness Review (CRR)
  - Critical Design Review (CDR)
  - Pre-Environmental Review (PER)
  - Pre-Ship/Operational Readiness Review (PSR/ORR)
  - Mission Readiness Review (MRR)
  - Flight Readiness Review (FRR)

Additional Mission Reviews

- Additional Mission Reviews supplement the required reviews and shall be conducted by independent consultants, peers or project/mission team personnel.
- Systems Requirements Review - Recommended
  - Peer Reviews - Recommended
  - Risk Mitigation Reviews - Required

Risk Mitigation/Mission Readiness

- Risk Mitigation and Mission Readiness will be evaluated by GSFC and KSC through reviews.
  - Risk mitigation reviews will be implemented as part of the review process beginning at CDR.
  - The reviews will enhance the probability of mission success and will cover the following mission elements:
    - Spacecraft and instrument(s)
    - Mission operations
    - Launch vehicle integration
    - Mission-unique items for launch vehicle and mission operations

Requirements Verification

- Each project/mission team must conduct a verification program to ensure all flight hardware meets the specified mission requirements.
- Survival of all expected environments must be simulated by functional demonstration, analysis, physical measurement or test.
  - Adequate documentation must be provided, including a verification plan, matrix and procedures.
  - Guidelines are contained in the GSFC General Environmental Verification Specification for STS and ELV Payloads, Subsystems and Components (GEVS).

Flight and Ground Safety

- Each project/mission team will establish, implement and maintain a system safety program which:
  - Identifies and control hazards for personnel, hardware, facilities and equipment.
  - Meets safety requirements for the appropriate launch site.
  - Meets industrial safety requirements for each team member's institution.

References

- Earth Explorers Program Mission Assurance Guidelines & Requirements
- Earth Explorers Program Project/Mission Confirmation Plan
- Earth Explorers Program Flight & Ground Safety Requirements

- All references are available on the Earth Explorers Program library web site:

  http://earthexplorers.gsfc.nasa.gov/library.html